



## Root colonization and Isolation of spores from rhizospheric soil of Sugarcane in Ardhapur Region of Nanded District

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### Abstract

Arbuscular mycorrhizal fungi play an important role in the mobilization nutrients and enhancing plant growth. It maintains the intimate link between the plant roots and soil. Root colonization and Isolation of spores from rhizospheric soil of Sugarcane in Ardhapur Region of Nanded District Rhizospheric soil was collected from fields of Ardhapur region of Nanded District and were analyzed by using wet sieving and decanting method suggested by Gerdman and Nicolson method (1963). The roots of Sugarcane showed 85 % mycorrhizal colonization and the rounded, vesicles were prominent. The rhizospheric soil was screened for spore density and population. The spore density were recorded as 230 spores per 100gm of soil and The spore population mainly consist of different species of Arbuscular mycorrhizal such as mainly *Acaulospora laevis*, *Glomus mosseae*, *Glomus reticulatum*, *Glomus macrocarpum*.

### INTRODUCTION

German Botanist Frank (1885) coined the term mycorrhizae for the first time to designate the symbiotic relationship between the fungi and plant roots. Since then scientists started exploiting them for the welfare of mankind. The term ‘mycorrhiza’ in its broadest sense is the non-pathogenic association of fungi and the roots of higher plants. The root- fungus association is symbiotic and the whole association is being considered as a ‘functionally distinct organ’ involved in mineral nutrient uptake from the soil. (Kar, 1993). Mycorrhizal fungi are having intimate association with roots of higher plants forming a symbiotic relationship providing nutrients to the plants. The Arbuscular Mycorrhizal diversity in herbaceous vegetation medicinal plants, in

halophytes plants have been investigated by many workers (Bagyaraj, D. J. 2014 Kannan, K. and Lakshminarashiman, C. 1988. Kumar., et. al 2013. Mulla et. al., 1994. Mulani., et. al., 2004. Mulani and Waghmare 2012. Mulani and Prabhu 2002. Parameswaran, and Augustine, 1988. Isolation and identification of arbuscular mycorrhizal fungi from agricultural fields of Vietnam investigated by (Sasvari et.al., 2012). Growth and biomass of *Piper longum* L was increased with inoculation of arbuscular mycorrhizal fungi. (Seema and Rajkumar, 2015). Essential oil production, nutrient uptake and root colonization in basil was increased with inoculation arbuscular mycorrhizal fungi. (Mirhassan et.al., 2010).

*Saccharum officinarum* L., commonly known as sugarcane, has been cultivated globally for hundreds of years (Ali et al., 2019). Sugarcane is well known for its economic value that produce ca. 70% of the world's sugar. Through the primary product of sugarcane is refined sugar, various by-products including sugarcane juice, brown sugar, bagasse, molasses, straw and press mud are obtained in an unrefined form during its processing. Molasses can be utilized in the production of ethanol and biogas, whereas sugarcane wax presents a rich source of sterols and policosanols, which are widely used in many cosmetic and medical products as an alternative to the pricey carnauba wax (Sars Ali et al., 2021).

### Materials and Methods

#### Isolation of spores by using wet-sieving method (Gerdman and Nicolson 1963)

Spore extraction is involved in three sub steps such as wet-sieving, sedimentation, flotation. Mix 5 gm of soil in 250 ml of lukewarm water in a beaker until all aggregates disperse to a uniform suspension. Allow the heavier particles to settle down. Filter the suspension through 710 µm sieve to remove large organic matter and roots. Then solution was sieved through series of sieves i.e. 710 µm, 210 µm, 150 µm, 75 µm, 45 µm and 25 µm respectively. Content of each sieve i.e. 210 µm, 150 µm, 75 µm, 45 µm and 25 µm was taken separately on blotting paper in petriplate and this petriplate was observed under stereo zoom binocular microscope.

#### Percentage of root colonization (Phillips and Hayman, 1970)

Young root segments were taken in test tube adding 10% KOH and it autoclaved at 15 lbs for 1 hr. After 10 minutes 10% KOH was removed from test tube then root segments were washed under tap water with 2 to 3 times. Then 10 ml 1N HCL was added and were kept for 5 minutes for neutralization of root tissue. Then HCL was removed and washed the root segments 2 to 3 times with tap water. After 30 minutes root segments stained with cotton blue and kept for 24 hrs. After 24 hrs root segments mounted on

slide with Acetic acid – glycerol (1:1v/v). Seal the corners of the cover slip with DPX, root colonization was observed under compound microscope. Then % of Arbuscular Mycorrhizal fungal colonization calculated by using this formula,

$$\text{Percent of mycorrhizal colonization} = \frac{\text{Number of root segments colonized}}{\text{Total number of root segments examined}} \times 100$$

### Result and Discussion

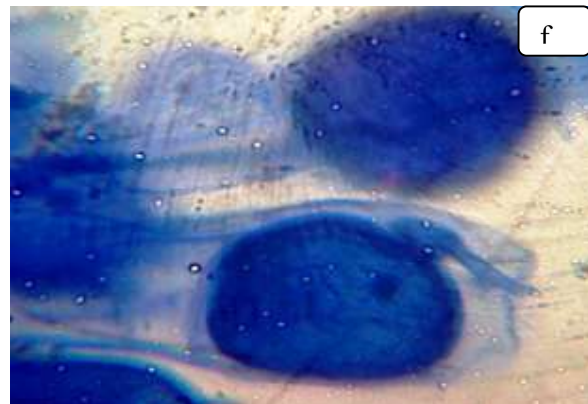
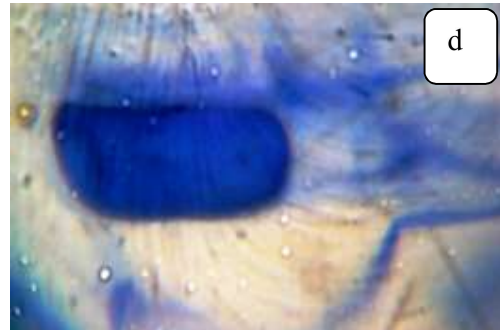
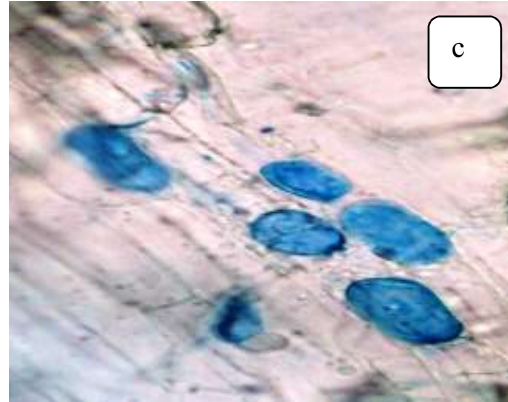
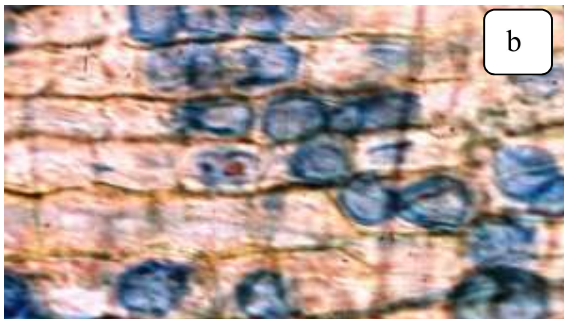
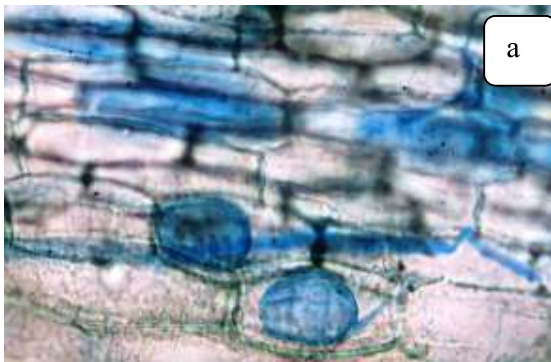
The roots of Sugarcane showed 85% Mycorrhizal colonization and the rounded, vesicles were prominent. The rhizospheric soil was screened for spore density and population. The spore density were recorded as 230 spores per 100gm of soil and the spore population mainly consist of different species of Arbuscular mycorrhizal such as mainly consist of *Glomus*, *Acaulospora* and *Gigaspora*. Spores were identified by using the manual of (Schenck and Perez, 1990). *Glomus fasciculatum* with subtending hyphae. Rounded shaped *Glomus reticulatum* and *Glomus species*. *Glomus fragilistatum*, *Glomus citricolla*, ruptured wall of *Glomus macrocarpum* and *Glomus globiformum*, *Glomus mosseae* and *Acaulospora laevis*, *Acaulospora sp.* And *Scutellospora pellicida*, *Scutellospora auriglobosa* and *Scutellospora calspora*. *Gigaspora rosea*. Similar observation made by Sasvari et. al., (2012) in their studies highest number of spores found in the tomato and peanuts at agricultural field of Vietnam.

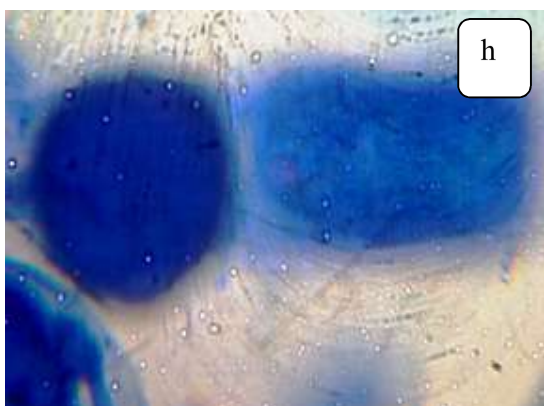
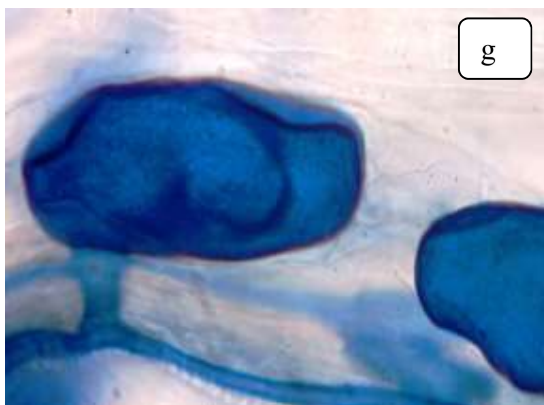
The roots of *Aloe vera* showed 90 % root colonization and spore density was recorded as 250 spores per 100 gm of soil. Such observation was made by Mulani and Waghmare, (2012). The presence of large number of spore with varied population of spores indicated their universal occurrence in the soil of university campus. Such observations were made by Mulani and Prabhu. (2002), Mulani et.al., (2004), Prabhu (2002) and Sathe (2005). Mulani and Prabhu had observed highest count of chlamydospores occurring in the root zone soil of *Dipcadi saxorum*. The murmy soil with

moisture % and low humidity with high temperature favors more chlamydospore formation. Similar observations were made by Harinikumar and Bagyaraj (1988) and Bagyaraj (1995) in tropical soil. Recently Pawar and Kakde (2012) have carried out the studies on the AMF associated with some medicinal plants from Mumbai region. They reported eight different species of *Glomus* namely *G. aggregatum*, *G. Boreale*, *G. fasciculatum*, *G. geosporum*, *G. heterosporum*, *G. segmentatum*, *G. tortuosum*, *G. radiatum* associated with the Sugarcane L. showing in Fig - a, b, c, d, e, f, g, i (Plate-I). Magnified view of rounded vesicles, Hyphae and Arbuscules seen in whole mount of root of Sugarcane (40X, 100X) different spores were isolated from rhizospheric soil of sugarcane L. from Ardhapur region in Nanded District.

Fig. -a, b- Coenocytic hyphae, mycelium and Oval shaped Vesicles, arbuscules seen in root whole mount of Sugarcane (10X, 40X); fig c, d, e, f, g :Magnified view of Oval shaped Vesicles seen in whole mount of root of Sugarcane (40X, 100X).

**PLATE-I**





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